2012 – BEACON – Covidien Seminar #3

Douglas B. Shire, Ph.D.

Restoring Useful Vision to the Blind: The Boston Retinal Implant Project

Presented by: Douglas B Shire Ph.D., Engineering Manager, Boston Retinal Implant Project

Douglas B. Shire received the B.S. degree from Rensselaer Polytechnic Institute, Troy, NY, in 1984, and the Ph.D. degree from Cornell University, Ithaca, NY, in 1989.He then worked with Hewlett Packard, Optoelectronics Division (now Agilent Technologies), and in 1994, he rejoined Cornell as a postdoctoral associate; he is now a Visiting Scientist. He has served as an Adjunct Assistant Professor of Electrical Engineering at Syracuse University. In 1997, he joined BRIP, where he developed microfabrication processes for electrode arrays as a member of the VA CIVR, Boston, MA. Since 2006, he has served as the Boston Retinal Implant Project's Engineering Manager. Dr. Shire is a member of Tau Beta Pi, Eta Kappa Nu, IEEE, and ARVO.

The purpose of the Boston Retinal Implant Project is to develop a visual prosthesis to restore some useful vision to patients who have become blind from degenerative retinal diseases like retinitis pigmentosa (RP) and age-related macular degeneration (AMD). Both of these conditions cause a gradual loss of photoreceptors, yet they spare a substantial fraction of the retinal ganglion cells (RGCs). The axons of these RGCs form the optic nerve, which is a critical part of the neural pathway from the retina to the brain's visual cortex. The prevalence of RP is approximately 1 in every 4000 live births, and there are approximately 1.7 million affected individuals worldwide. AMD, meanwhile, is the leading cause of blindness in the developed world, with roughly 2 million affected patients in the United States alone. This number is expected to increase 50% by the year 2020, as the population ages. The best existing treatments slow or stabilize the progress of these diseases, but no treatment has been available that can consistently restore a functional improvement in vision. The Boston Retinal Implant Project and others have nevertheless shown that electrical stimulation of RGCs can produce visual percepts that vary with the strength and location of the stimulation. Some groups have even reported that severely blind patients can read again with the assistance of a retinal prosthesis. Our first-generation wirelessly powered implantable retinal stimulation device was implanted in Yucatan mini-pigs in 2008. We will describe the design and functional results from an upgraded version of the implant, which has since experienced three major design changes: 1) protection of the custom ASIC implant circuit in a hermetic titanium enclosure having >256 I/O; 2) more favorable magnetic coupling obtained by relocating the secondary coils to the front of the eye and increasing their size; and 3) easier surgical access for electrode array insertion. We also describe the results of long-term tests performed on our microfabricated thin-film electrode array, which is the only part of our device that enters the eye; the remainder of the implant device is affixed to the outside of the eye (the sclera). Collectively, the BRIP team has needed to push the envelope of implantable neurostimulator technology and packaging/assembly in order to provide meaningful stimuli to as many 'pixels' as possible, and we look forward to discussing these advances.

Wednesday, October 17, 2012
Networking Reception 5:30-6:30 PM Presentation 6:30-7:30 PM
Covidien, 60 Middletown Avenue, North Haven, CT
Directions and parking information will be sent with each RSVP.

NO CHARGE TO ATTEND, BUT RSVP REQUIRED BY OCTOBER 10 – No Exceptions!!

RSVP to: 860-547-1995 or toll free: 877-723-2266
Email: lsnow@beaconalliance.org